UL 60079-30-1:2017 (R2025)

(IEC 60079-30-1:2015, MOD)

STANDARD FOR SAFETY

Explosive Atmospheres – Part 30-1: Electrical Resistance Trace Heating – General and Testing Requirements

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UL Standard for Safety for Explosive Atmospheres – Part 30-1: Electrical Resistance Trace Heating – General and Testing Requirements, UL 60079-30-1

First Edition, Dated May 5, 2017

Summary of Topics

This revision of ANSI/UL 60079-30-1 dated May 19, 2026 includes an editorial correction to remove the title to the table in the IEC Foreword.

UL 60079-30-1 is an adoption of IEC/IEEE 60079-30-1, First Edition, issued by the IEC September 2015. Please note that the National Difference document incorporates all of the U.S. national differences for UL 60079-30-1.

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MAY 5, 2017
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UL 60079-30-1:2017 (R2025)

(IEC 60079-30-1:2015, MOD)

Standard for Explosive Atmospheres – Part 30-1: Electrical Resistance Trace Heating – General and Testing Requirements

First Edition

May 5, 2017

This ANSI/UL Standard for Safety consists of the First Edition including revisions through May 19, 2026.

The most recent designation of ANSI/UL 60079-30-1 as an American National Standard (ANSI) occurred on November 5, 2025. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

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FOREWORD

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EXPLOSIVE ATMOSPHERES – Part 30-1: Electrical resistance trace heating – General and testing requirements

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International Standard IEC/IEEE 60079-30-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres, in cooperation with the Petroleum & Chemical Industry Committee of the IEEE Industrial Applications Society under the IEC/IEEE Dual Logo Agreement.

This publication is published as an IEC/IEEE Dual Logo standard.

NOTE A list of IEEE participants can be found at the following URL: http://standards.ieee.org/downloads/60079/60079-30-1-2015/60079-30-1-2015_wg-participants.pdf .

This first edition of IEC/IEEE 60079-30-1 cancels and replaces the first edition of IEC 60079- 30-1 published in 2007 and constitutes a technical revision.

This edition includes the following significant changes, apart from the general revision and updating of the first edition of IEC 60079-30-1 and harmonization with IEEE Std 515, with respect to the previous edition:

• the inclusion of a minimum temperature impact test;

• the addition of a mechanical procedure in the thermal stability test;

• the inclusion of a thermal performance test to replace the thermal safety requirements;

• the inclusion of a second procedure utilizing a plate fixture for sheath temperature determination;

• the inclusion of an ultraviolet and condensation test;

• the revision and significant expansion of documentation requirements;

• the addition of Annexes covering requirements for Divisions 1 and 2;

• the addition of a table covering the applicability of requirements from IEC 60079-0;

• the addition of an Annex covering trace heater product design verification methodology (formerly located in IEC 60079-30-2);

• the further harmonization of this edition with several national standards.

The significance of changes between IEC 60079-30-1, Edition 1.0 (2007) and IEC/IEEE 60079-30-1, Edition 1.0 (2015) is as listed below:

		Type		
Changes	**Clause**	**Minor and editorial changes**	**Extension**	**Major technical changes**
Addition of clarification for the exclusion of EPLs Ga and Da	1	X		
Addition of requirements for the Division method of area classification that may be applied by some users	1		X	
Addition of table specifying the application or exclusion of specific clauses of IEC 60079-0 Edition 6	1	X		
For stabilized designs, a clarification for the need for verification by testing and the addition of a table for the specific requirements	4.5.2	X		

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Changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
For controlled designs, a clarification for the need for verification by testing and the addition of a table for the specific requirements	4.5.3	X		
For controlled designs, clarifications and additions on the separate requirements for Gb/Db and Gc/Dc	4.5.3		X	
The requirements for calibration of the flammability test fixture are replaced with equivalent requirements for the energy levels of the test gases	5.1.4	X		
Addition of a minimum temperature impact test	5.1.5			C1
For thermal stability, the addition of a bending requirement on a mandrel	5.1.11			C1
The replacement of the thermal safety procedure with a thermal performance procedure	5.1.12			C2
The addition of a second procedure utilizing a plate fixture for the systems method for maximum sheath temperature determination	5.1.13.2			C3
Addition of outdoor exposure test	5.1.16			C4
Requirement changed for the marking of the minimum installation temperature	6.1			C5
Addition of new markings requirements for field assembled components	6.2			C5
Additions and changes to the documentation requirements	7			C5
Addition of Annex	Annex A	X		
Addition of Annex	Annex B	X		
Addition of Annex specifying trace heating design verification methodology, moved from IEC 60079-30-2	Annex C			C6
Addition of Annex for the Division method of area classification that may be applied by some users	Annex D		X	
Addition of Annex for the Division method of area classification that may be applied by some users	Annex E		X	

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version.

Explanations:

A) Definitions

Minor and editorial changes:

clarification

decrease of technical requirements

minor technical change

editorial corrections

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These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

Extension addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

Major technical changes

addition of technical requirements

increase of technical requirements

These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

B) Information about the background of 'Major Technical Changes'

C1 – The requirements for additional mechanical testing have been included for harmonization and for added safety.

C2 – The requirements for thermal performance have been included to recognize the necessity for thermal stability of products in explosive atmospheres.

C3 – A second procedure utilizing a plate fixture has been included for sheath temperature determination, which may be used in lieu of the sheath temperature verification part of 5.1.13.4.2.

C4 – An outdoor exposure test has been added to cover products that may be exposed to sunlight and moisture in the intended application.

C5 – Additional marking and documentation requirements have been added to provide additional information to the end user.

C6 – The trace heating design verification methodology has been added to align with the evaluation requirements for the stabilized design and the controlled design methods of maximum sheath temperature determination.

The text of this standard is based on the following IEC documents:

FDIS	Report on voting
31/1191/FDIS	31/1201/RVD

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Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

International standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

This standard is intended to be used in conjunction with IEC/IEEE 60079-30-2:2015, *Explosive atmospheres – Part 30-2: Electrical resistance trace heating – Application guide for design, installation and maintenance*.

A list of all parts of IEC 60079 series, under the general title *Explosive atmospheres*, can be found on the IEC website.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

IEC/IEEE 60079-30-1 is intended to provide a comprehensive overview of the essential requirements and testing appropriate to electric surface heating equipment used in explosive atmospheres. The requirements of this part of IEC 60079 are considered to be the minimum requirements for equipment protection levels Gb, Gc, Db, and Dc in explosive atmospheres for gases, dusts, and fibres/flyings. While some of this work already exists in national standards or international standards, this standard has collated much of this existing work and considerably added to it. This standard also contains the minimum requirements for users applying the Division method of area classification.

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EXPLOSIVE ATMOSPHERES – Part 30-1: Electrical resistance trace heating – General and testing requirements

1 Scope

1DV DR *Modification of Clause 1 to replace with the following:*

This ~~part of IEC 60079~~ standard specifies general and testing requirements for electrical resistance trace heaters for application in explosive atmospheres with the exclusion of those for EPL Ga and Da. This standard covers trace heaters that comprise either factory or field (work-site) assembled units, and which may be series trace heaters, parallel trace heaters, trace heater pads, or trace heater panels that have been assembled and/or terminated in accordance with the manufacturer's instructions.

This standard also includes requirements for termination assemblies and control methods used with trace heating systems. The explosive atmospheres referred to in this standard are those defined in IEC 60079-10-1 and IEC 60079-10-2.

Annexes D and E outline the application of this standard for those users applying the Division method of area classification.

This standard supplements and modifies the general requirements of ~~IEC 60079-0~~ UL 60079-0, except as indicated in Table 1. Where a requirement of this standard conflicts with a requirement of ~~IEC 60079-0~~ UL 60079-0, the requirement of this standard takes precedence.

Where references are made to other IEC 60079 standards, the reference requirements found in these standards apply as modified by any applicable U.S. National Differences.

Table 1
Application or exclusion of specific clauses of ~~IEC 60079-0~~ UL 60079-0

~~IEC~~ UL 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 6.0 (2011) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
1	Scope	Applies	Applies	Applies
2	Normative references	Applies	Applies	Applies
3	Terms and definitions	Applies, except ambient temperature, see 3.1	Applies, except ambient temperature, see 3.1	Applies, except ambient temperature, see 3.1
4	Equipment grouping	Applies	Applies	Applies
4.1	Group I	Applies	Excluded	Applies
4.2	Group II	Applies, always IIC	Excluded	Applies
4.3	Group III	Excluded	Applies, outside of thermal insulation only, always IIIC	Applies, outside of thermal insulation only

Table 1 Continued on Next Page

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Table 1 Continued

~~IEC~~ UL 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 6.0 (2011) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
4.4	Equipment for a particular explosive atmosphere	Excluded	Excluded	Applies
5.1	Environmental influences	Applies	Applies	Applies
5.1.1	Ambient temperature	Replaced by 6.1e)	Replaced by 6.1e)	Applies, see 3.1
5.1.2	External source of heating or cooling	Applies	Applies	Applies
5.2	Service temperature	Modified	Modified	Applies
5.3.1	Determination of maximum surface temperature	Replaced by 4.5 in conjunction with 5.1.13	Replaced by 4.5 in conjunction with 5.1.13 only when tested in accordance with 5.1.13.3.	Applies
5.3.2.1	Group I electrical equipment	Applies	Excluded	Applies
5.3.2.2	Group II electrical equipment	Applies	Excluded	Applies
5.3.2.3.1	Group III electrical equipment, Maximum surface temperature determined without a dust layer	Excluded	Applies, where the maximum sheath temperatures determined by IEC/IEEE 60079-30-1 are used in place of the method for temperature determination from ~~IEC 60079-0~~ UL 60079-0.	Applies
5.3.2.3.2	Group III electrical equipment Maximum surface temperature with respect to dust layers	Excluded	Applies, where the maximum sheath temperature is determined only for those surfaces that are specified to be exposed to layers of combustible dust. Does not apply for trace heaters specified to be covered by thermal insulation.	Applies
5.3.3	Small component temperature for Group I and Group II electrical equipment	Excluded	Excluded	Applies
6.1	Requirements for all electrical equipment – General	Applies	Applies	Applies
6.2	Mechanical strength	Replaced by 4.2	Replaced by 4.2	When in direct contact with the trace heater, may be substituted by 4.2
6.3	Opening times	Excluded	Excluded	Applies
6.4	Circulating currents in enclosures (e.g. of large electrical machines)	Excluded	Excluded	Excluded

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Table 1 Continued

~~IEC~~ UL 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 6.0 (2011) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
6.5	Gasket retention	Excluded	Excluded	Applies
6.6	Electromagnetic and ultrasonic radiating equipment	Excluded	Excluded	Applies
7.1.1	Non-metallic enclosures and non-metallic parts of enclosures – Applicability	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2.1	Specification of materials, General	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2.2	Specification of materials, plastic materials	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.1.2.3	Elastomers	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies
7.2	Thermal endurance	Replaced by requirements and tests of this standard	Replaced by requirements and tests of this standard	Applies
7.3	Resistance to light	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Applies
7.4.1	Electrostatic charges on external non-metallic materials, Applicability	Excluded	Excluded	Applies
7.4.2	Avoidance of a build-up of electrostatic charge on Group I or Group II electrical equipment	Excluded	Excluded	Applies
7.4.3	Avoidance of a build-up of electrostatic charge on equipment for Group III	Excluded	Excluded	Applies
7.5	Accessible metal parts	Excluded	Excluded	Applies
8.1	Material composition	Excluded	Excluded	Applies
8.2	Group I	Excluded	Excluded	Applies
8.3	Group II	Excluded	Excluded	Applies
8.4	Group III	Excluded	Excluded	Applies
9	Fasteners	Excluded	Excluded	Applies
10	Interlocking devices	Excluded	Excluded	Applies
11	Bushings	Excluded	Excluded	Applies
12	Materials used for cementing	Replaced by the last paragraph of 4.1	Replaced by the last paragraph of 4.1	Applies

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ULSE INC. COPYRIGHTED MATERIAL – NOT AUTHORIZED FOR FURTHER REPRODUCTION OR DISTRIBUTION WITHOUT PERMISSION FROM ULSE INC.

Table 1 Continued

~~IEC~~ UL 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 6.0 (2011) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
13	Ex Components	Applies	Applies	Applies
14	Connection facilities and termination compartments	Covered by the requirements of this standard	Covered by the requirements of this standard	Applies
15	Connection facilities for earthing and bonding conductors	Replaced by 5.1.15	Replaced by 5.1.15	Applies
16	Entries into enclosures	Excluded	Excluded	Applies
17	Supplementary requirements for rotating electrical machines	Excluded	Excluded	Excluded
18	Supplementary requirements for switchgear	Excluded	Excluded	Excluded
19	Supplementary requirements for fuses	Excluded	Excluded	Applies
20	Supplementary requirements for plugs and sockets	Excluded	Excluded	Applies
21	Supplementary requirements for luminaires	Excluded	Excluded	Excluded
22	Supplementary requirements for caplights and handlights	Excluded	Excluded	Excluded
23	Equipment incorporating cells and batteries	Excluded	Excluded	Applies
24	Documentation	Applies	Applies	Applies
25	Compliance of prototype or sample with documents	Applies	Applies	Applies
26.1	General	Applies	Applies	Applies
26.2	Test configuration	Applies	Applies.	Applies
26.3	Tests in explosive test mixtures	Excluded	Excluded	Applies
26.4	Tests of enclosures	Excluded	Excluded	Applies
26.4.1	Order of tests	Excluded	Excluded	Applies
26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	Excluded	Excluded	Applies
26.4.1.2	Non-metallic enclosures or non-metallic parts of enclosures	Excluded	Excluded	Applies

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Table 1 Continued

~~IEC~~ UL 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 6.0 (2011) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
26.4.2	Resistance to impact	Replaced by 5.1.5	Replaced by 5.1.5	Applies
26.4.3	Drop test	Excluded	Excluded	Excluded
26.4.4	Acceptance criteria	Replaced by 5.1.5	Replaced by 5.1.5	Applies
26.4.5	Degree of protection by enclosure	Replaced by 5.1.8 and/or 5.1.9	Replaced by 5.1.8 and/or 5.1.9	Applies
26.5	Thermal tests	Modified.	Modified	Applies
26.5.1	Temperature measurement	Replaced by 5.1.13	Replaced by 5.1.13	Applies
26.5.2	Thermal shock test	Excluded	Excluded	Applies
26.5.3	Small component ignition test	Excluded	Excluded	Applies
26.6	Torque test for bushings	Excluded	Excluded	Applies
26.7	Non-metallic enclosures or non-metallic parts of enclosures	Excluded	Excluded	Applies
26.8	Thermal endurance to heat	Replaced by 5.1.11	Replaced by 5.1.11	Applies
26.9	Thermal endurance to cold	Replaced by 5.1.7	Replaced by 5.1.7	Applies
26.10	Resistance to light	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Replaced by 5.1.16 for trace heaters and integral components specified for outdoor exposure	Applies
26.11	Resistance to chemical agents for Group I electrical equipment	Applies for Group I	Excluded	Applies
26.12	Earth continuity	Excluded	Excluded	Applies
26.13	Surface resistance test of parts of enclosures of non-metallic materials	Excluded	Excluded	Applies
26.14	Measurement of capacitance	Excluded	Excluded	Applies
26.15	Verification of ratings of ventilating fans	Excluded	Excluded	Excluded
26.16	Alternative qualification of elastomeric sealing O-rings	Excluded	Excluded	Applies
27	Routine tests	Applies	Applies	Applies
28	Manufacturers responsibility	Applies	Applies	Applies
29	Marking	Modified	Modified	Applies

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Table 1 Continued

~~IEC~~ UL 60079-0		Electrical resistance trace heaters and integral components		Terminations as separate components
Ed. 6.0 (2011) (informative)	Clause / Subclause title (normative)	Group I and Group II	Group III	
30	Instructions	Modified	Modified	Applies
Annex A	Supplementary requirements for Ex cable glands	Excluded	Excluded	Applies
Annex B	Requirements for Ex components	Excluded	Excluded	Applies
Annex C	Example of rig for resistance to impact test	Replaced by 5.1.5	Replaced by 5.1.5	Applies
Annex D	Motors supplied by converters	Excluded	Excluded	Excluded
Annex E	Temperature rise testing of electric machines	Excluded	Excluded	Excluded
Annex F	Guideline flowchart for tests of non-metallic enclosures or non-metallic parts of enclosures (26.4)	Excluded	Excluded	Applies
NOTE 1 Clause numbers in the three right-hand columns of this table refer to IEC/IEEE 60079-30-1 NOTE 2 The clause number in the above table is shown for information only. The applicable requirements of ~~IEC 60079-0~~ UL 60079-0 are identified by the clause title which is normative.				
Applies: this requirement of ~~IEC 60079-0~~ UL 60079-0 is applied without change. Excluded: this requirement of ~~IEC 60079-0~~ UL 60079-0 does not apply. Modified: this requirement of ~~IEC 60079-0~~ UL 60079-0 is modified as detailed in this standard.				

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-151:2001, *Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

IEC 60050-426:2008, *International Electrotechnical Vocabulary – Part 426: Equipment for explosive atmospheres*

IEC 60079-0:2011, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60695-11-3, *Fire hazard testing – Part 11-3: Test flames – 500 W flames – Apparatus and confirmational test methods*

ISO 4582, *Plastics – Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*

ISO 4892-1, *Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance*

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ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ASTM D5025, *Standard specification for laboratory burner used for small-scale burning tests on plastic materials*

ASTM G155, *Standard practice for operating xenon arc light apparatus for exposure of nonmetallic materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60079-0, IEC 60079-7, IEC 60050-151 and IEC 60050-426 (except as modified by this clause) as well as the following apply.

NOTE Definition 3.40 is identical to definition 3.16 of IEC 60079-7: 2006.

3.1
ambient temperature
< trace heating >
temperature surrounding the workpiece including the trace heater and any thermal insulation or weather barrier that may be applied

3.1.1
maximum ambient temperature
highest specified ambient temperature

3.1.2
minimum ambient temperature
< trace heating >
lowest ambient temperature specified at which trace heating is operable and performs according to specified requirements (and on which heat-loss calculations are based)

[SOURCE: IEC 60050-426:2008, 426-20-20]

3.2
branch circuit
portion of the wiring installation between the overcurrent device protecting the circuit and the trace heater unit(s)

[SOURCE: IEC 60050-426:2008, 426-20-02]

3.3
connections (terminations)

3.3.1
cold lead
electrically insulated conductor or conductors used to connect a trace heater to a branch circuit and designed so that it does not produce significant heat

[SOURCE: IEC 60050-426:2008, 426-20-03]

3.3.2
end termination
termination, which may be heat producing, applied to a trace heater at the end opposite to that where the power is supplied

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